

REMARKS

Claim 1, as now amended for the first time, is a combination of original Claim 1 and original Claim 4. Thus, Claim 1 as amended is equivalent to Claim 4 as originally presented.

Claim 5, as now amended for the first time, is a combination of original Claim 5 and original Claim 8. Thus, Claim 5 as amended is equivalent to Claim 8 as originally presented.

Claim 9, as now amended for the first time, is a combination of original Claim 9 and original Claim 13. Thus, Claim 9 as amended is equivalent to Claim 13 as originally presented.

In view of these revisions, it is submitted that the rejections of claims 3, 7, and 12 over 35 U.S.C. § 112 are overcome.

Original Claims 4 and 13 (now amended Claims 1 and 9) were rejected over a combination of two references, as was original Claim 8 (now amended Claim 5). Particularly, at page 3 of the Office Action of June 27, 2003, Examiner Barry rejected claim 4 "under 35 USC Section 103(a) over Franks in view of Carlson or Mitchell. U.S. Patent No. 4,670,154 to Carlson suggests use of a mixed resin bed in water deionization applications so that the bed can be sized to operate for a long period of time before regeneration of the resins becomes necessary. It would have been obvious to have used a mixed resin bed in order to operate the bed for a longer period of time, as suggested by Carlson. Alternatively, it would have been obvious to have done so for any of the reasons given by U.S. Patent No. 6,534,554 to Mitchell."

Claim 5, as originally presented, was rejected as anticipated by Franks.

Applicant submits that the combination made by the Examiner is neither taught nor suggested anywhere in the cited prior art. In fact, the prior art cited by the Examiner in no way provides the answer or solution to the problem solved by the Applicant. Rather, the references cited by the Examiner merely reinforce the fact that the prior art had never discovered the solution to this problem.

The solution to the problem of exhaustion of mixed resin bed capacity was solved by the mere reversal of the direction of the flow of the water being purified. In particular, as noted

beginning at line 1 of page 4 of the present application, "it has been found, surprisingly, that the reversal of the flow of water through the resin-containing tank both extends the operating capacity of the resin, and produces a better quality of highly purified water. Particularly, comparing the device and process of the invention to typical down flow mixed bed ion exchange deionizers, 50%-60% higher operating deionization capacity is achieved through a monobed (or mixed bed) ion exchange resin bed of the present invention's single tank configuration. The process incorporates improved kinetics through the mixed bed ion exchange resin bed utilizing a bi-lateral flow pattern upwardly through the resin bed. The water produced is of a higher quality than water produced in most typical two bed systems. Two bed systems produce water having, on an average, 200,000-1,000,000 Ohm-cm of specific resistance. In contrast, the present invention provides water in the range of 8,000,000 Ohms at the start to 200,000 Ohms, the reverse of a typical two separate bed system. The cationic and anionic resin components are in a consistent 1:1 equivalent (40%-60% by volume) mixture. Thus, the resins are exhausted uniformly in a 1:1 ratio, providing almost neutral pH in a perfectly deionized water."

This disclosure in the present specification reveals that: (a) prior art mixed bed systems were limited to downflow systems, i.e., systems in which water was purified by moving that water from the top of the tank down through the mixed bed resin, and out of the bottom of the tank; (b) the mixed bed system of the invention, in which water is purified by moving that water up through the mixed bed resin, both increases the capacity of the ion exchange resin, and results in a more highly purified water.

A "mixed bed resin" is a resin mix comprised of a combination of an anionic and a cationic resin, available commercially, with both the cationic and anionic resin blended or mixed together in a homogeneous manner, so that they are largely indistinguishable. See present specification, page 2, lines 17-18, and page 6, lines 2-9. The "mixed bed resin" of the invention contrasts with systems in which a tank contains discrete and distinguishable layers of resins, i.e., a layer of a cationic resin, followed by a layer of anionic resin, and then perhaps followed by another cationic resin layer and another anionic resin layer. See '187 patent to Franks, column 8, lines 17-24. The "mixed bed

resin" of the present invention also contrasts with systems in which "two different ionic forms" are contained in that system. This phrase refers to two different cations or two different anions, in the same system. See Franks, column 6, lines 27-29, and lines 33-36, where "two different ionic forms" are described as a "cation exchange resin...in the H⁺ form...(and) in the Na⁺ form."

Nothing in the art suggests either the combination made by the Examiner to arrive at the Section 103 rejection of original Claim 4, now amended Claim 1. As noted above, the primary reference to Franks shows nothing more than the polishing or purifying of water by passing that water upwardly through a *non-mixed bed single* type of resin, or through layered resins. Nothing in Franks provides or suggests that water can be purified by passing it upwardly through a mixed resin bed, as that term is used in the specification. Nor does Franks teach or suggest that the invention of Claim 1, as now amended, will result in the improved results of the present invention.

The '154 patent to Carlson and the '554 patent to Mitchell are said to remedy the deficiencies in Franks, i.e., the failure to teach the use of a *mixed bed resin* in a system in which water is purified by moving the water upwardly through that mixed bed resin. While Carlson does teach the use of a mixed bed resin, see Column 2, lines 20-24, it does not teach the inventive aspect of this invention, i.e., the movement of water upwardly through a mixed resin bed, nor does it teach the improved results of this process. Rather, it teaches the movement of water downwardly through a mixed bed resin, see Column 2, lines 40-41, which is the very type of prior art system that had the deficiencies the present invention was intended to overcome.

Mitchell, like Carlson, fails to teach the use of a mixed bed resin in a system in which water is purified by moving the water upwardly through that mixed bed resin.

The mere combination of the separate teachings of two or three references, each having elements of the claimed invention, cannot lead to a *prima facie* case of obviousness. "An examiner may often find every element of a claimed invention in the prior art. If identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue. ...this court requires the examiner to show a motivation to combine the references that create the case of obviousness. In other words, the examiner must show reasons that the skilled artisan, confronted

with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the various cited prior art references for combination in the manner claimed." *In re Rouffet*, 149 F.3d 1350, 1357 (Fed.Cir. 1998).


Here, it is respectfully submitted that the Examiner has provided no explanation as to why one of skill in the art would have been motivated to combine the references in the manner suggested by the Examiner. Lacking a motivation to combine references, there can be no *prima facie* case of obviousness. *In re Rouffet*, 149 F.3d 1350, 1357 (Fed.Cir. 1998) ("here, the Board did not identify any motivation to choose these references for combination").

Hence, Applicants submit that no *prima facie* case of obviousness exists, and the obviousness rejection should be withdrawn. All of the claims in this application depend, either directly or indirectly, on Claims 1, 5, or 9. It follows that as amended Claims 1, 5, and 9 are now allowable, all of the remaining claims are allowable.

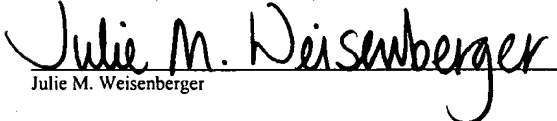
Allowance of all pending claims (Claims 1-3 and 5-7 and 9-12) is thus requested.

Respectfully submitted,

Date: February 2, 2004

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